Remarks

The following remarks are responsive to the Office Action of March 4, 2008.

At the time of the Office Action, claims 1-36 were pending. Claims 1-14, 16-31 and 33-36 were rejected under 35 U.S.C. §103(a) as obvious over Koh (U.S. Patent No. 4,949,393) in view of Grill (U.S. Patent No. 6,370,507). Claims 15 and 32 were objected to.

Objection to the Specification

1. *The Title has been amended in accordance with the Examiner's suggestion.*

In the OA, on p. 2, the Examiner objected to the title as not being descriptive. The Examiner then suggested a new title that was provided as being more clearly indicative of the invention to which the claims are directed.

Applicants thank the Examiner for his suggested title and Applicants have amended the title in accordance with this suggestion (with an addition to include the appertaining method). Having complied with the Examiner's suggestion, Applicants respectfully request that the objection to the title be withdrawn from the application.

Objection to Claims 15 and 32

2. *Claims 15 and 32 have been amended to depend from a single claim, and new claims 37 and 38 have been added for consideration by the Examiner that respectively depend from the second dependence in each of claims 15 and 32.*

In the OA, on p. 2, the Examiner objected to claims 15 and 32 as depending from 2 claims each.

Applicants thank the Examiner for noting this error and have amended claims 15 and 32 so that they depend solely from the first claim listed. Applicants have added claims 37 and 38 to depend solely from the second claim listed. Pursuant to the claim amendments and additions,

Applicants respectfully contend that the Examiner's objections to these claims have been addressed and request that the Examiner withdraw the objection to the claims from the application.

35 U.S.C. §103(a) Claims 1–14, 16–31, and 33–36 Obviousness over Koh in view of Grill

3. The combination of Koh in view of Grill fails to teach or suggest the elements of determining an allocation of Nmax – N0 coding bits for parameters of a second subset, and ranking of the Nmax – N0 coding bits allocated to the parameters of the second subset in a determined order, as required by all independent claims. The subject of the claimed invention provides a method for a novel fine granularity variable bitrate codec that is not taught or suggested by the combination.

In the OA, on pp. 2–4, the Examiner rejected independent claims 1, 16, 35, and 36 as being obvious over the combination of Koh and Grill. The Examiner indicated how each of the elements of Koh and Grill was being read on the claimed invention.

The Applicants respectfully disagree with the characterizations of the teaching of the prior art, as indicated by the Examiner.

Koh Disclosure

Koh discloses an adaptive bit allocation method of a sub-band coder by using a fixed set of a number of bits (Abstract). The detailed description of this method can be found at 3:1 – 4:15 (<col.>:<line>). Basically, the audio sample is divided into sub-band signals (3:1–10) and each sub-band signal is normalized by a scaling factor based on the energy of the sub-hand (3:12–15). The scaling factor is sent as side information (3:24–28), and each normalized sub-band is fed to a quantizer that encodes it using a desired number of bits prior to transmission via multiplexer (col.3, 1.30-34). Koh observes that these steps are well-known from the prior art (1:21–54).

Koh differs from the prior art in its method to allocate bits to sub-bands. The algorithm disclosed by Koh comprises defining the number of sub-bands n_i that will receive an allocated

number of bits (3:37–65). Thus, Koh ranks the sub-bands according to a function of their energy and this ranking is used for the bit allocation.

For instance, Koh gives an example of an allocation of 27 bits (4:3). The disclosed algorithm provides that one sub-band receives 5 bits, one other sub-band receives 4 bits, three other sub-bands receive 2 bits, five other sub-bands receive l bits and two sub-bands receive 0 bits. This allocation is fixed and is based on a training set distributing all available bits (3:36–40), and the choice of the sub-bands to receive a specific bit allocation is based on a scale factor (4:4–5). Therefore, the allocation to each sub-band will vary from frame to frame, depending on the scaling, factor, i.e., the energy of each sub-band in the current frame (4:12–14), but the structure of the allocation itself is fixed (4:10–11).

Using this fixed allocation pattern is sub-optimal, since it represents a mean allocation obtained by training. In extreme cases, this pattern is not appropriate at all. For instance, a flat spectrum sound such as that of an "s" sound needs a rather uniform bit allocation, while a tonal signal needs to concentrate all bits in one or a few bands.

Grill Disclosure

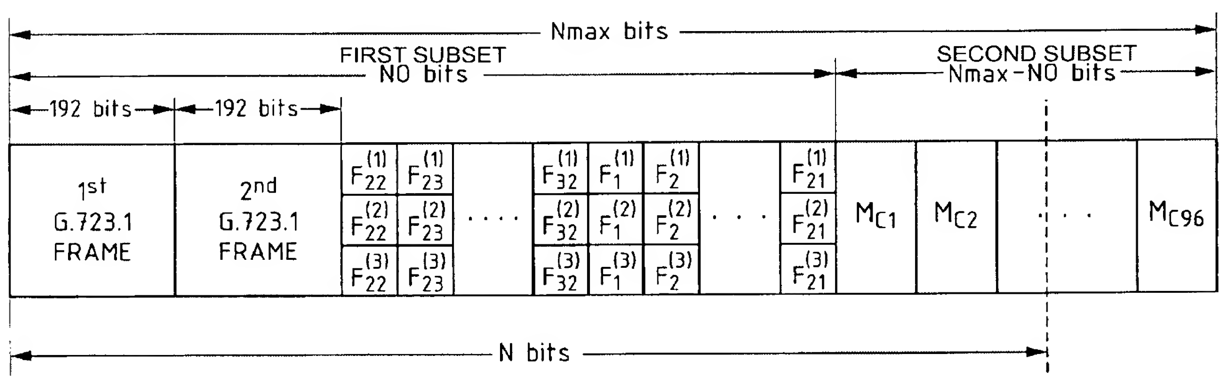
Grill discloses a method for coding a signal using a scalable coder/decoder in which, in a first step, in the frequency domain, the signal output by the first coder (i.e., the "kernel" or voice coder 14) is subtracted from the initial signal (Fig. 1, elem. 26) so as to generate, in the frequency domain, a signal having substantially only frequencies in the audio frequency domain (see 7:13 – 8:20 for Grill's discussion on the choice of simulcast or differential coding of each sub-band depending on its energy), then this signal is quantized by using a psychoacoustic model (8:32–37).

As explained at 8:46–65, Fig. 1 shows a 3-stage audio coder in which each stage is dedicated to the coding of a specific quality. For instance, the coder of Fig. 1 has its first stage for the coding of the first 4 kHz of the spectrum, the bandwidth of the second stage is up to 12 kHz to obtain HIFI quality, and the third stage coder carries out coding to a bandwidth of 24

kHz in order to obtain a sound quality corresponding to that of a CD. Therefore, Grill discloses a prior art scalable coder as explained at 3:3 – 4:5 of the present Specification.

Present Invention

The subject of the claimed invention (e.g., as claimed in claim 1) is completely different, since it provides a method for a novel fine granularity variable bitrate codec: after coding the first subset on N0 bits, the remaining N_{max} – N0 bits are allocated to the parameters of the second subset by any bit allocation method (it could be that of Koh, but is not required to be, and in fact is not preferred to be since the bit allocation method of Koh is suboptimal), then the N_{max} – N0 ***bits*** are ranked.



This ranking is used to select which bits will be sent to the decoder in the case where the sending bitrate is lower than the maximum bitrate for what the allocation was made. In this case, only N < N_{max} bits are computed and sent, where the N bits correspond to the N0 bits of the first subset and the first N-N0 of the ranked bits.

Thus, the claimed invention is directed to a variable bitrate codec where the bitrate can be easily lowered with fine granularity (bit-wise) at the encoder by sending only the N first ranked bits. N can be freely chosen between N0 and N_{max}. This kind of variable bitrate coder is not known from the prior art. Koh does disclose any aspect of the variable bitrate coding.

Neither Koh or Grill, alone or in combination, disclose such a coder adapted to a fine granularity variable bitrate.

In Grill, the coder is defined at the very beginning and the number of stages depends on the quality needed at the output, each stage being specific to the frequency bandwidth in consideration of a psychoacoustic model (Abstract). Therefore, the only possible choice in terms of number of bits per frame is limited by the ability to use the output of each stage. For instance, in a 3-stage coder, there are only 3 different output qualities, and the number of bits per stage is fixed.

Koh does not disclose a fine granularity variable bit rate either. In fact, for a predetermined total quantity of bits, Koh defines the number of sub-bands for which a specific allocation of bits is determined. This allocation is determined at the beginning. Then, for each frame, the energy of each sub-band is determined in order to define which sub-band will receive a determined number of bits. Furthermore, there is no reference to an ordering in Koh. The multiplexer 7 has no specific means to order the bits specifically.

Applicants further clarify that contrary to the Examiner's assertions on p. 3, there is no disclosure in Koh in which there is a determination of an allocation of Nmax – N0 coding bits for parameters of a second subset, and a ranking of the Nmax – N0 coding bits allocated to the parameters of the second subset in a determined order.

The Examiner stated on p. 3:

> Koh discloses… ranking the Nmax-N0 coding bits allocated to the parameters of the second subset in a determined order (see Col. 4, lines 4–15, where Koh discusses allocation based on scale factors), in which the allocation and/or the order of ranking of the Nmax-N0 coding bits is determined as a function of the coded parameters of the first subset (see Col. 4, lines 4–15, where Koh discusses allocation of bit groups to sub-bands in reference to scaling factors)

However, this does not describe ranking the Nmax – N0 coding bits, as required by all independent claims in the application. The Examiner has indicated that Koh, at 3:45–55 discloses coding parameters on a number N0 of coding bits such that N0<Nmax. The only

portion of Koh that discloses a proportion of bits with regard to the total number of bits in this cited section is where Koh states:

> Next, we define f_i as [equation omitted] where N_T is the total number of bits available for allocation throughout the training sequence. f_i therefore represents the portion of N_T used in allocating i bits for the coding of sub-band signals.

However, there is no discussion in Koh related to the ranking of the Nmax-N0 coding bits. The allocation based on scale factors as described by the Examiner is not a ranking of Nmax-N0 coding bits (for parameters of the second subset) as required by all independent claims.

The significance of this is that, if the total quantity of bits allocated to a frame varies, Koh teaches that you need to calculate a new allocation of number of sub-groups per number of allocated bits.

Even combined with Grill, Koh does not disclose or suggest the claimed invention as Grill can not adapt itself to a variation in the number of coding bits except in a discrete and predetermined manner.

Therefore, independent claims 1, 16, 35, and 36 are not obvious over the combination of Koh and Grill and the remaining dependent claims are not obvious by virtue of their dependence respectively from these independent claims.

For these reasons, Applicants respectfully assert that the present invention is not obvious in view of Koh and Grill and requests that the 35 U.S.C. §103 rejection be withdrawn from the application.

Conslusion

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

/brian c. rupp/

Brian C. Rupp, Reg. No. 35,665
Mark Bergner, Reg. No. 45,877
DRINKER BIDDLE & REATH LLP
191 N. Wacker Drive, Suite 3700
Chicago, Illinois 60606-1698
(312) 569-1000 (telephone)
(312) 569-3000 (facsimile)
Customer No.: 08968

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